CLAIMS

What is claimed is:

1.   A system comprising:

a communication network; and

a food product manager in communication with a monitored location through said communication network, wherein said manager receives product-temperature condition information from said monitored location and determines a food characteristic for a refrigerated product as a function of a frequency and severity of said product-temperature condition information.

2.   The system of Claim 1, wherein said product-temperature condition is cyclical.

3.   The system of Claim 1, wherein said function is a time-temperature calculation.

4.   The system of Claim 3, wherein said time-temperature calculation includes time and temperature set points combined to provide an alarming point.

5.   The system of Claim 1, wherein said function is a degree-minute calculation.

6.   The system of Claim 5, wherein said degree-minute calculation integrates an ideal product temperature curve with respect to time.

7.   The system of Claim 1, wherein said function is a bacteria-count calculation.

8.   The system of Claim 7, wherein said bacteria-count calculation periodically calculates a bacteria count for a given temperature at a given time.

9.   The system of Claim 8, wherein said periodic calculation produces the bacteria-count curve.

10.   The system of Claim 7, wherein said bacteria-count calculation is a function of a base bacteria count, time, product type, and temperature.

11.   The system of Claim 7, wherein said bacteria-count calculation includes separately counting both spoiler bacteria and pathogen bacteria.

12.   The system of Claim 11, wherein said manager generates a food quality alarm when said spoiler bacteria reaches a predetermined level.

13.   The system of Claim 11, wherein said manager generates a food safety alarm when said pathogen bacteria reaches a predetermined level.

14.   The system of Claim 7, wherein said manager generates a food quality index calculation to monitor the quality of said refrigerated product.

15.   The system of Claim 14, wherein said food quality index includes:

measuring a temperature of said refrigerated product;

determining an average temperature as a function of said temperature;

determining an average shelf-life rating for said refrigerated product;

determining an average ideal storage temperature for said refrigerated product;

determining an average base bacteria count as a function of product type;

determining a bacteria count as a function of said average temperature, said average shelf-life rating and said average base bacteria count;

determining a quality factor as a function of said bacteria count and said average base bacteria count; and

determining an average quality factor.

16.   The system of Claim 7, wherein said manager generates a food safety index calculation to provide evaluation of food safety risk.

17.   The system of Claim 16, wherein said food safety index includes:

measuring a temperature of said refrigerated product;

determining a maximum temperature as a function of said temperature;

determining a maximum shelf-life rating for said refrigerated product;

determining a maximum base bacteria count as a function of product type;

determining a bacteria count as a function of said maximum temperature, said maximum shelf-life rating and said maximum base bacteria count;

determining a safety factor as a function of said bacteria count and said maximum base bacteria count; and

determining an average safety factor.

18.   A method comprising:

transferring product-temperature condition information from a refrigerated location to a management center; and

outputting a food characteristic value at said management center for a refrigerated product as a function of said frequency and severity of said product-temperature condition.

19.   The method of Claim 18, wherein said food product index is a food safety index determined by:

measuring a temperature of each of said plurality of product types within said plurality of refrigeration cases;

determining a maximum temperature for each of said plurality of refrigeration cases as a function of said temperature;

determining a maximum shelf-life rating for each of said plurality of refrigeration cases as a function of product type;

determining a maximum base bacteria count for said plurality of refrigeration cases as a function of product type;

determining a bacteria count for each of said refrigeration cases as a function of said maximum temperature, said maximum shelf-life rating and said maximum base bacteria count;

determining a safety factor as a function of said bacteria count and said base bacteria count for each of said refrigeration cases; and

determining an average safety factor for said plurality of refrigeration cases.

20.   The method of Claim 18, wherein said food product index is a food quality index determined by:

measuring a temperature of each of said plurality of product types within said plurality of refrigeration cases;

determining an average temperature for each of said plurality of refrigeration cases as a function of said temperature;

determining an average shelf-life rating for each of said plurality of refrigeration cases as a function of product type;

determining an average ideal storage temperature for each of said plurality of refrigeration cases;

determining an average base bacteria count for said plurality of refrigeration cases as a function of product type;

determining a bacteria count for each of said refrigeration cases as a function of said average temperature, said average shelf-life rating and said average base bacteria count;

determining a quality factor as a function of said bacteria count and said average base bacteria count for each of said refrigeration cases; and

determining an average quality factor for said plurality of refrigeration cases.

21.   The method of Claim 18, further comprising initiating an alarm if said food product index exceeds a predetermined level.

22.   The method of Claim 21, wherein said alarm is initiated at either of said management center and the remote location.

23.   A system comprising a processing center in communication with a refrigeration system through a communication network, wherein said processing center receives information from said refrigeration system for determining a food product index for a plurality of product types within a plurality of refrigeration cases.

24.   The system of Claim 23, wherein said food product index is a food safety index determined by:

measuring a temperature of each of said plurality of product types within said plurality of refrigeration cases;

determining a maximum temperature for each of said plurality of refrigeration cases as a function of said temperature;

determining a maximum shelf-life rating for each of said plurality of refrigeration cases as a function of product type;

determining a maximum base bacteria count for said plurality of refrigeration cases as a function of product type;

determining a bacteria count for each of said refrigeration cases as a function of said maximum temperature, said maximum shelf-life rating and said maximum base bacteria count;

determining a safety factor as a function of said bacteria count and said base bacteria count for each of said refrigeration cases; and

determining an average safety factor for said plurality of refrigeration cases.

25.   The system of Claim 23, wherein said food product index is a food quality index determined by:

measuring a temperature of each of said plurality of product types within said plurality of refrigeration cases;

determining an average temperature for each of said plurality of refrigeration cases as a function of said temperature;

determining an average shelf-life rating for each of said plurality of refrigeration cases as a function of product type;

determining an average ideal storage temperature for each of said plurality of refrigeration cases;

determining an average base bacteria count for said plurality of refrigeration cases as a function of product type;

determining a bacteria count for each of said refrigeration cases as a function of said average temperature, said average shelf-life rating and said average base bacteria count;

determining a quality factor as a function of said bacteria count and said average base bacteria count for each of said refrigeration cases; and

determining an average quality factor for said plurality of refrigeration cases.

26.   The system of Claim 23, further comprising initiating an alarm if said food product index exceeds a predetermined level.

27. The system of Claim 26, wherein said alarm is initiated at either of said management center and the remote location.

28.   A method of monitoring and managing a refrigeration system at a retail location, comprising:

transmitting information from a refrigeration system at a retail location to a processing center at a remote location via a communication network; and

determining a food product index at said processing center for a plurality of product types within a plurality of refrigeration cases of said refrigeration system.

29.   The method of Claim 28, wherein said food product index is a food safety index determined by:

measuring a temperature of each of said plurality of product types within said plurality of refrigeration cases;

determining a maximum temperature for each of said plurality of refrigeration cases as a function of said temperature;

determining a maximum shelf-life rating for each of said plurality of refrigeration cases as a function of product type;

determining a maximum base bacteria count for said plurality of refrigeration cases as a function of product type;

determining a bacteria count for each of said refrigeration cases as a function of said maximum temperature, said maximum shelf-life rating and said maximum base bacteria count;

determining a safety factor as a function of said bacteria count and said base bacteria count for each of said refrigeration cases; and

determining an average safety factor for said plurality of refrigeration cases.

30.   The method of Claim 28, wherein said food product index is a food quality index determined by:

measuring a temperature of each of said plurality of product types within said plurality of refrigeration cases;

determining an average temperature for each of said plurality of refrigeration cases as a function of said temperature;

determining an average shelf-life rating for each of said plurality of refrigeration cases as a function of product type;

determining an average ideal storage temperature for each of said plurality of refrigeration cases;

determining an average base bacteria count for said plurality of refrigeration cases as a function of product type;

determining a bacteria count for each of said refrigeration cases as a function of said average temperature, said average shelf-life rating and said average base bacteria count;

determining a quality factor as a function of said bacteria count and said average base bacteria count for each of said refrigeration cases; and

determining an average quality factor for said plurality of refrigeration cases.

31.   The method of Claim 28, further comprising initiating an alarm if said food product index exceeds a predetermined level.

32.   The method of Claim 31, wherein said alarm is initiated at either of said management center and the remote location.